2014 Rabies Summary
Massachusetts Department of Public Health

The following summarizes data collected on animal specimens from Massachusetts sent to the William A. Hinton State Laboratory Institute (HSLI) for rabies testing from January to December 2014. Cumulative reports summarizing rabies testing from 1992-2002, and annual reports from 2003 to 2013 are available on the MDPH website and can be found at www.mass.gov/dph/rabies.

Number of Submissions and Positive Results by Year

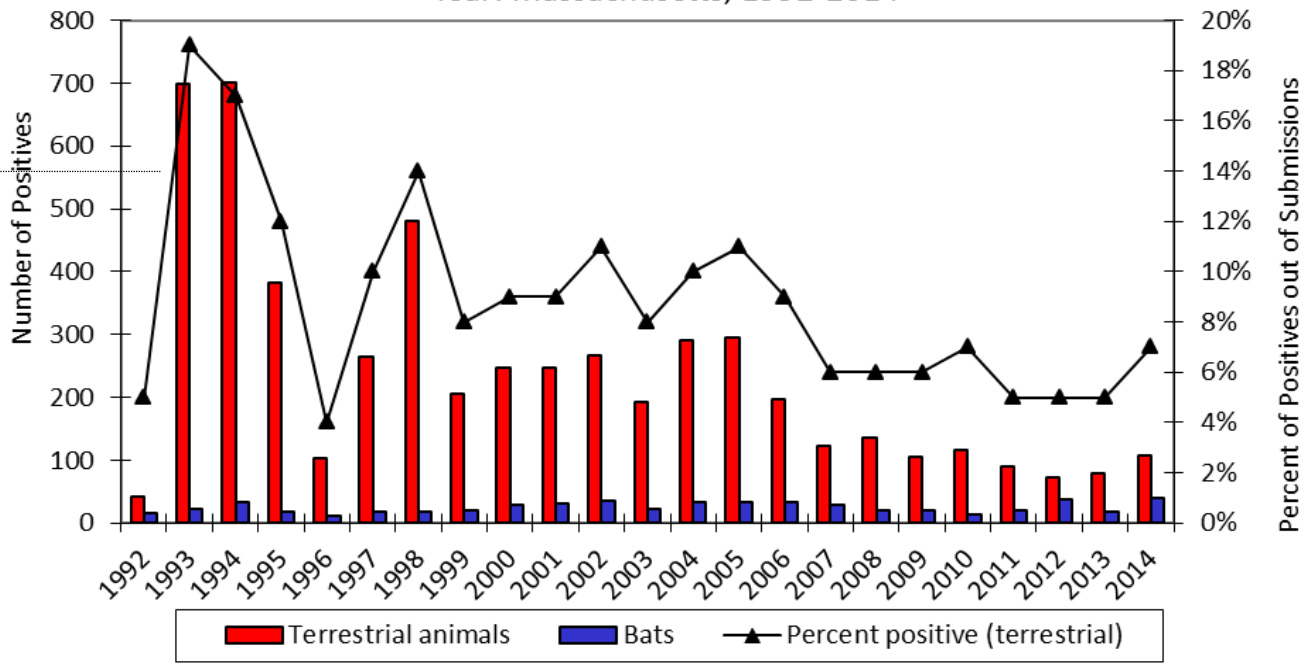
The number and percentage of terrestrial animals that tested positive in 2014 was higher than that of the previous three years (see **Table 1 and Figure 1**). The number of bats that tested positive was higher than last year; but the percentage of bats testing positives remained similar.

Table 1. Number of Submissions, Positive Results and Percent* Positive by Year and Type of Animal

	TERRESTRIAL ANIMALS			BATS		
Year	Number Submitted	Number Positive	% Positive	Number Submitted	Number Positive	% Positive
1992	926	42	5%	143	15	10%
1993	3660	698	19%	289	22	8%
1994	4119	700	17%	391	34	9%
1995	3175	383	12%	241	17	7%
1996	2701	103	4%	277	12	4%
1997	2771	264	10%	334	17	5%
1998	3483	480	14%	439	18	4%
1999	2643	205	8%	595	21	4%
2000	2666	247	9%	611	29	5%
2001	2615	248	9%	710	32	4%
2002	2505	267	11%	613	36	6%
2003	2358	193	8%	602	23	4%
2004	2842	291	10%	600	34	6%
2005	2653	296	11%	708	33	5%
2006	2122	197	9%	756	34	5%
2007	1988	123	6%	787	29	4%
2008	2298	135	6%	748	19	3%
2009	1747	106	6%	696	21	3%
2010	1740	117	7%	678	14	2%
2011	1700	90	5%	753	20	3%
2012	1594	73	5%	1196	38	3%
2013	1644	79	5%	1045	18	2%
2014	**1644**	**108**	**7%**	**1175**	**40**	**3%**
Total	**55,594**	**5,445**	**10%**	**14,387**	**576**	**4%**

* Calculated to nearest percent

Figure 1: Numbers of Animals Positive for Rabies and Percent Positive by Year: Massachusetts, 1992-2014



Notable Rabies Situations

In 2014, 2,819 specimens were submitted to Hinton State Laboratory Institute (HSLI) for rabies testing. Of these specimens, 148 (5%) tested positive for rabies. **Table 2** shows data on positive animals for 2014. In 2014, four domestic animals tested positive; all were cats. Three of these cases illustrate why domestic animals with wounds of unknown origin must be treated as possible rabies exposures.

While visiting Pennsylvania (PA) a Middlesex County resident found a kitten and returned with it to Massachusetts (MA). The kitten was from a litter, all of which had wounds of unknown origin. Two weeks later, the kitten developed fever and ataxia, was euthanized and tested positive for rabies. Five MA adults who syringe-fed the kitten received post exposure prophylaxis (PEP). One dog in the home was placed under quarantine. The MA Department of Public Health (MDPH) worked with PA public health officials to identify the litter of kittens in PA and human exposures there.

In Worcester County, a feral cat was captured by the local animal inspector (AI) and brought for care for apparent broken hind legs. After surgery, the cat died. Because it bit a veterinary technician during treatment, it was submitted and tested positive for rabies. The technician and another with an open wound exposed to the cat's saliva, received PEP. The local AI posted flyers in the area and one adult and one teenager were identified as exposed and both received PEP. The local health department issued a press release and the local AI collected additional stray cats that may have been exposed to the rabid cat.

A kitten found with a wound of unknown origin a month earlier was placed in a foster home in Essex County. Approximately a week after placement, the kitten developed symptoms of neurologic illness and was returned to the shelter. From there, it was taken to a veterinary clinic where it was euthanized. It was submitted and tested positive for rabies. The foster owner and two staff members at the veterinary clinic were bitten by the kitten and all received PEP. Four other cats in the foster home were placed under quarantine.

Number of Submissions and Positive Results by Species

Raccoons, skunks and foxes together, accounted for the large majority of rabies positive animals in Massachusetts (43%, 31% and 34% respectively), although the proportion of all rabies positive animals that they represent varied by quarter (**Figure 2**). Of note is that a slightly higher percentage of foxes (34%) tested positive than skunks (31%) in 2014.

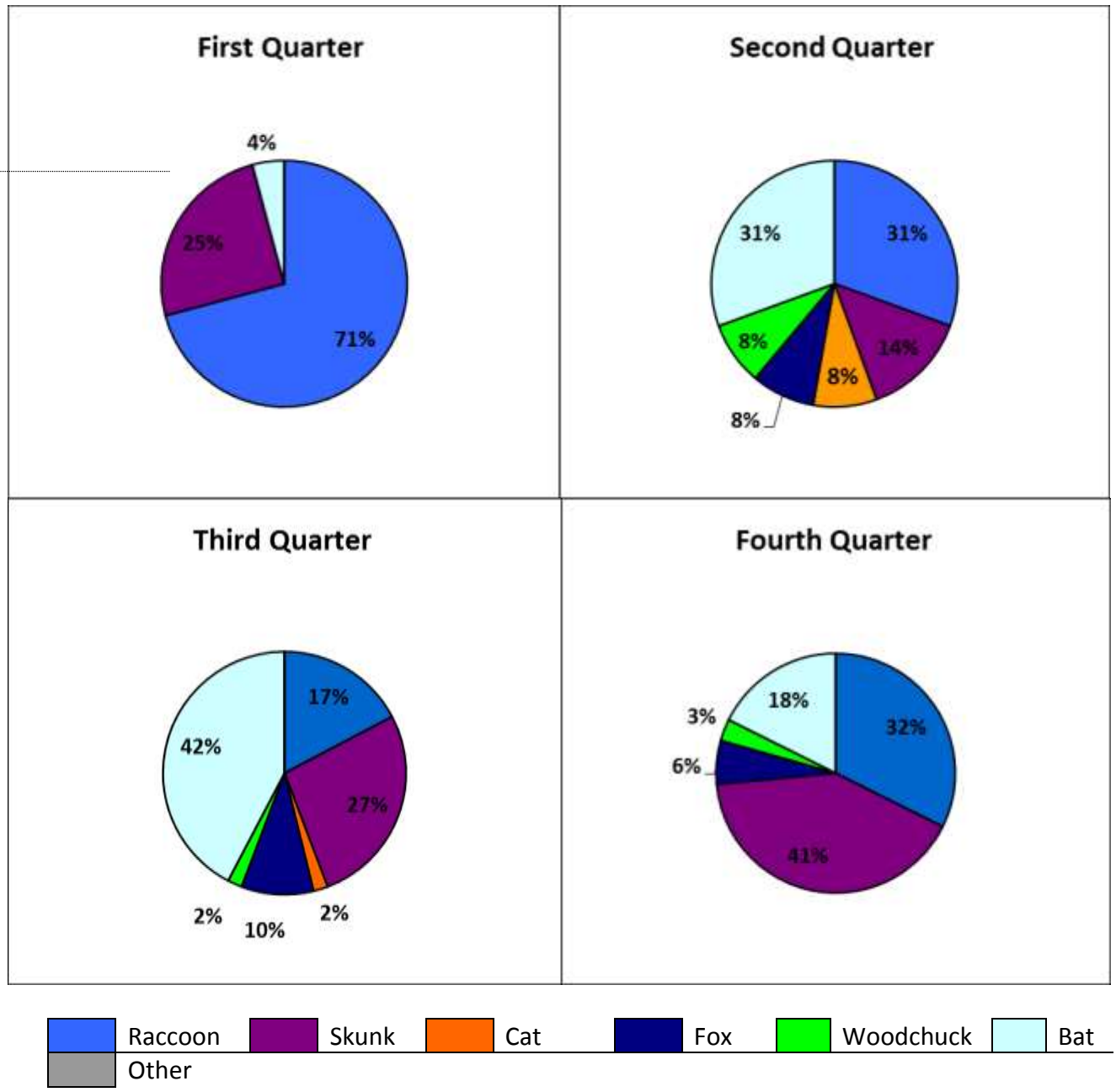
Table 2. Number of Animals Positive for Rabies/Animals Submitted (%*), 2014

	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			Total		
Animal	Number Positive	Number Submitted	%	Number Positive	Number Submitted	%	Number Positive	Number Submitted	%	Number Positive	Number Submitted	%	Number Positive	Number Submitted	%
Raccoon	17	23	74%	11	38	29%	9	27	33%	11	24	46%	48	112	43%
Skunk	6	15	40%	5	13	38%	14	68	21%	14	29	48%	39	125	31%
Cat	0	170	0%	3	164	2%	1	215	0%	0	181	0%	4	730	1%
Fox	0	3	0%	3	10	30%	5	11	45%	2	5	40%	10	29	34%
Woodchuck	0	2	0%	3	44	7%	1	33	3%	1	3	33%	5	82	6%
Bat	1	113	1%	11	267	4%	22	729	3%	6	66	9%	40	1175	3%
Cow	0	1	0%	0	1	0%	0	0	0%	0	1	0%	0	3	0%
Coyote	0	1	0%	0	2	0%	0	0	0%	0	1	0%	0	4	0%
Dog	0	113	0%	0	128	0%	0	131	0%	0	100	0%	0	472	0%
Other**	1	18	6%	1	31	0%	0	16	0%	0	22	0%	2	87	1%
Total	25	459	5%	36	698	5%	52	1230	4%	34	432	8%	148	2819	5%

* Calculated to nearest percent

** Includes squirrels, rabbits, sheep, pigs, goats, horses, beaver, chipmunks, donkeys, bobcats, and opossums

Figure 2. Proportion of All Positive Results Represented by Each Species, by Quarter, 2014



Cumulative Submissions and Results by Month

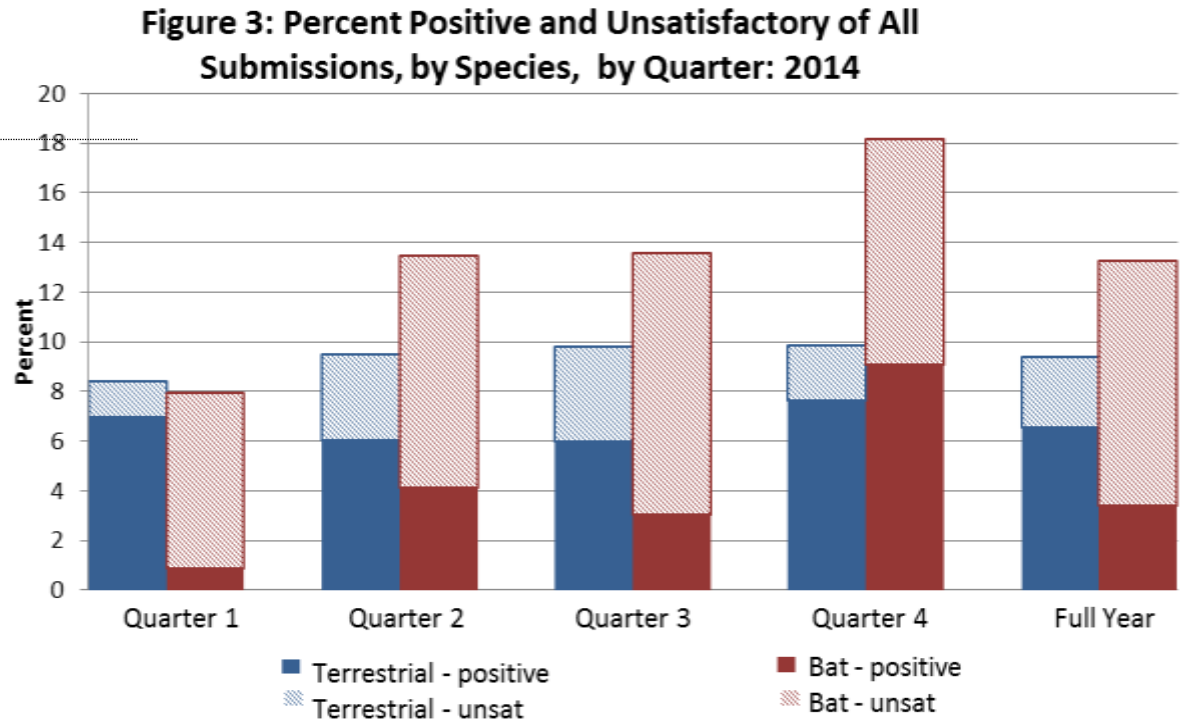
Animal submission numbers fluctuated throughout the year. As expected, the highest number of submissions for both terrestrial animals and bats occurred during June, July and August (see **Table 3**). The lowest number of submissions occurred during the winter months of December, January, and February. This same trend is seen annually and is due to the greater activity of wildlife species during the spring and summer months, coinciding with the time that humans increase their outdoor activity level. These simultaneous events result in more frequent contact between humans and wildlife, and lead to more animal rabies testing.

The proportion of animals testing positive and unsatisfactory for rabies also varies throughout the year, generally showing a consistent pattern from year-to-year (see **Table 3 and Figure 3**). The change in the percent positive is normally small between years during the same month and significant departures from this seasonal pattern can be used to detect alterations in the intensity of virus circulation in an area. Of note, the percent of both terrestrial animals and bats that tested positive in September and October increased significantly between 2013 and 2014. The percent of unsatisfactory bats in September and October increased from 10% and 0% in 2013 to 27% and 13% in 2014.

Table 3. Submissions, Number Positive and Unsatisfactory for Rabies, and Percent* Positive and Unsatisfactory by Month and Animal Type: 2013 and 2014

	TERRESTRIAL ANIMALS										BATS									
Month	**Submitted 2013**	**Positive 2013**		**Unsatisfactory 2013**		**Submitted 2014**	**Positive 2014**		**Unsatisfactory 2014**		**Submitted 2013**	**Positive 2013**		**Unsatisfactory 2013**		**Submitted 2014**	**Positive 2014**		**Unsatisfactory 2014**	
January	97	4	4%	0	0%	123	9	7%	0	0%	32	1	3%	3	9%	45	0	0%	3	7%
February	111	7	6%	2	2%	93	7	8%	1	1%	21	0	0%	2	10%	29	0	0%	1	3%
March	103	7	7%	3	3%	130	8	6%	4	3%	42	0	0%	2	5%	39	1	3%	4	10%
April	128	6	5%	1	1%	129	11	9%	4	3%	39	0	0%	7	18%	43	1	2%	7	16%
May	146	6	4%	7	5%	149	11	7%	4	3%	33	0	0%	3	9%	61	4	7%	4	7%
June	172	8	5%	8	5%	153	4	3%	7	5%	111	2	2%	2	2%	163	6	4%	14	9%
July	173	4	2%	12	7%	182	6	3%	7	4%	149	3	2%	18	12%	192	3	2%	15	8%
August	201	12	6%	10	5%	182	13	7%	7	4%	508	8	2%	56	11%	493	14	3%	50	10%
September	160	6	4%	7	4%	137	11	8%	5	4%	41	3	7%	4	10%	44	5	11%	12	27%
October	129	7	5%	2	2%	150	16	11%	2	1%	13	1	8%	0	0%	24	4	17%	3	13%
November	123	9	7%	2	2%	104	4	4%	2	2%	24	0	0%	2	8%	24	2	8%	1	4%
December	101	3	3%	3	3%	112	8	7%	4	4%	32	0	0%	3	9%	18	0	0%	2	11%
TOTAL	1644	79	5%	57	3%	1644	108	7%	47	3%	1045	18	3%	102	10%	1175	40	3%	116	10%

* Calculated to nearest percent



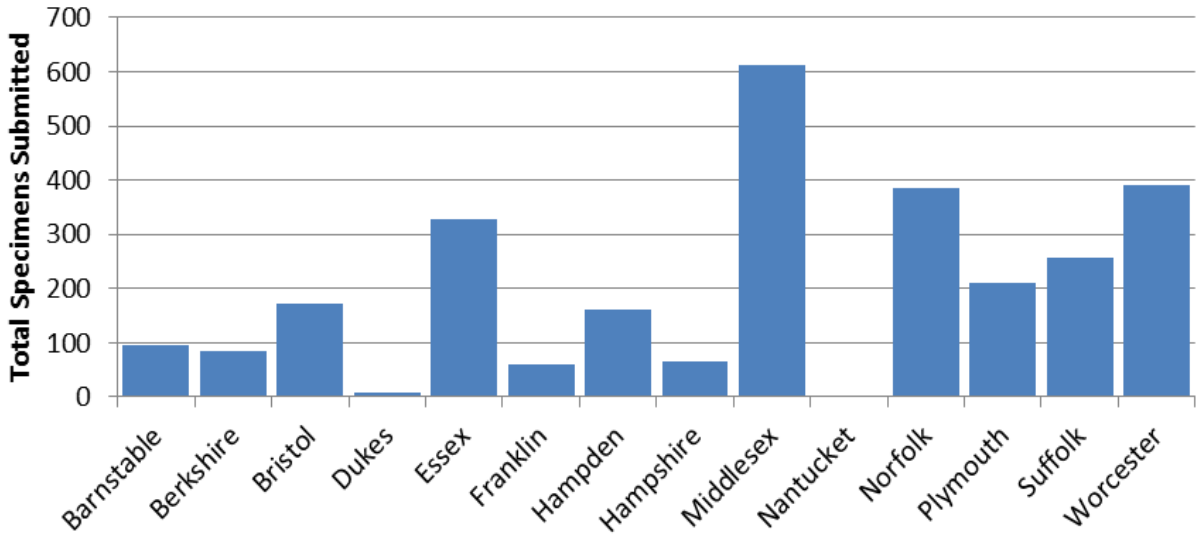
The distribution of positive and unsatisfactory rabies results varies throughout the year and by animal type (terrestrial versus bats) (**Figure 3**). In every quarter, more terrestrial animals test positive for rabies than are unsatisfactory for testing. In contrast, the number of bats testing positive each quarter was less than the number determined to be unsatisfactory for testing. Over the course of the year, twice as many terrestrial animals were positive than were unsatisfactory while there were three times as many unsatisfactory bats as there were positive ones.

Submissions and Positive Results by County

In 2014, all counties in Massachusetts expect Nantucket submitted at least one animal for rabies testing, and all counties, except Dukes, had at least one animal that tested positive (see **Table 4 and Figure 4**). Middlesex, Worcester, and Norfolk counties submitted the highest number of animals (n = 611, n = 328, n = 386, respectively). Worcester and Middlesex County had the highest number of animals that tested positive (n = 30, n=30) and Hampshire County had the highest percentage of submitted animals that tested positive (9%).

Table 4. Rabies Testing Data by County- Number of Animals Positive for Rabies/Number of Animals Submitted (%)					
County	**1st Quarter**	**2nd Quarter**	**3rd Quarter**	**4th Quarter**	**Cumulative**
Barnstable	0/17 (-- %)	0/27 (-- %)	0/38 (-- %)	0/14 (-- %)	0/96 (-- %)
Berkshire	1/14 (7%)	1/18 (6%)	2/32 (6%)	2/11 (18%)	6/84 (7%)
Bristol	0/23 (-- %)	1/53 (2%)	1/73 (1%)	1/23 (4%)	3/172 (2%)
Dukes	0/1 (-- %)	0/1 (-- %)	0/3 (-- %)	0/2 (-- %)	0/7 (-- %)
Essex	2/51 (4%)	2/76 (3%)	7/134 (5%)	8/67 (12%)	19/328 (6%)
Franklin	1/11 (9%)	1/15 (7%)	0/24 (-- %)	2/10 (20%)	4/60 (7%)
Hampden	5/33 (15%)	3/37 (8%)	3/69 (4%)	1/23 (4%)	12/162 (7%)
Hampshire	0/13 (-- %)	0/8 (-- %)	3/37 (8%)	3/7 (43%)	6/65 (9%)
Middlesex	5/101 (5%)	10/152 (7%)	9/276 (3%)	6/82 (7%)	30/611 (5%)
Nantucket	0/0 (-- %)	0/0 (-- %)	0/0 (-- %)	0/0 (-- %)	0/0 (-- %)
Norfolk	4/65 (6%)	2/94 (2%)	7/171 (4%)	5/56 (9%)	18/386 (5%)
Plymouth	2/37 (5%)	3/54 (6%)	2/85 (2%)	4/34 (12%)	11/210 (5%)
Suffolk	0/39 (-- %)	5/63 (8%)	4/118 (3%)	0/36 (-- %)	9/256 (4%)
Worcester	5/54 (9%)	9/100 (9%)	14 /170 (8%)	2/67 (3%)	30/391 (8%)

Figure 4: The Number of Animals Submitted for Rabies Testing by County: 2014



Mapping

MDPH maps rabies-positive terrestrial animals on an annual basis (see **Figure 5**).

Figure 5.